DS 21: Gaede Prize Symposium (Joint session of DS and O, organized by DS)

The prestigious Gaede prize of the German Vacuum Society (DVG e.V.) founded by Dr. Manfred Dunkel, head of the Leybold company for many years, is supported by Oerlikon Leybold Vacuum GmbH and regularly presented at the DPG Spring Meeting by the Surface Science and Thin Films Divisions. The Gaede prize is yearly awarded to young scientists (prior to their first professorship) for outstanding basic and applied research in the fields of vacuum physics and technology, thin films, surface science, materials and methods in solid state electronics, or nanotechnology. This symposium celebrates 30 years of Gaede prize, the first one being awarded to J. Kirschner in 1986. It comprises talks by the prize winner of this year, Dr. Julia Stähler (FHI Berlin), and previous winners, Prof. Jürgen Fassbender and Prof. Eberhard Umbach, complemented by the history of Gaede (Dr. Gerhard Voss, DVG and Head of the Vacuum Science and Technology Division of DPG). The list of previous prize winners (http://www.gaedepreis.org/preistraeger.html) comprises a large number of nowadays renowned colleagues for whom the Gaede prize was very supportive for their career.

Organizers: Dietrich R.T. Zahn (TU Chemnitz), Martin Wolf (FHI Berlin) and Norbert Esser (ISAS Berlin)

Time: Tuesday 13:30–15:30 Location: H11

Special Talk DS 21.1 Tue 13:30 H11

Wolfgang Gaede - Wegbereiter der modernen Vakuum-Technik — •Gerhard Voss — Oerlikon Leybold Vacuum, Köln

In diesem Vortrag geht es nicht nur um den Lebenslauf von Wolfgang Gaede, sondern auch um einige seiner wichtigsten Erfindungen, wie die Verbesserung der rotierenden Kapsel-pumpe (= Drehschieber-Pumpe), die Molekular(luft)pumpe, die Diffusionspumpe und die Drehschieber-Pumpe mit Gas-Ballast-Einrichtung.

Die bedeutenden Erfindungen von Wolfgang Gaede haben den enormen Aufschwung der Vakuum-Technik nach dem zweiten Weltkrieg erst möglich gemacht und stehen auch heute noch im Einsatz.

Prize Talk DS 21.2 Tue 14:00 H11

Ultrafast dynamics of many-body effects in solids and at interfaces: Polarons, excitons and correlated electrons — •Julia Stähler — Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin, Germany

Optical excitation of solids can lead to various interesting non-equilibrium phenomena that occur on electronic time and energy scales. These, for instance, involve the interaction of excited charge carriers among each other as well as with the lattice degrees of freedom. Key ingredient for such many-body effects is the Coulomb interaction and, importantly, its *screening*. Modification of the latter on ultrafast timescales disturbs the balance of competing forces in a system and can, thus, give rise to interesting transient properties. Exemplary for the diversity of such many-body effects and their impact also on the *equilibrium* qualities of materials, I will discuss the following three phenomena:

(i) Ultrafast dynamics of charge injection, trapping and polaronic stabilization during the birth of a solvated electron [1]

(ii) Femtosecond electron relaxation and ultrafast formation of excitons at polar and non-polar ZnO surfaces [2]

(iii) Instantaneous insulator-to-metal transition in photoexcited monoclinic VO_2 [3]

[1] J. Stähler *et al. J. Am. Chem. Soc.* **137**, 3520 (2015)
[2] J.-C. Deinert *et al. Phys. Rev. Lett.* **113**, 057602 (2014)
[3] D. Wegkamp *et al. Phys. Rev. Lett.* **113**, 216401 (2014)

Special Talk DS 21.3 Tue 14:30 H11

Ion beam modification of magnetic materials - revisited — •Jürgen Fassbender — Helmholtz-Zentrum Dresden-Rossendorf

In 2009 the Gaede prize was awarded for the ion induced modification and patterning of thin magnetic films. At that time most of the investigations were dealing with the local modification of magnetic anisotropies and exchange bias phenomena. In recent years we could show that also other magnetic properties, e.g. magnetic relaxation processes [1], can be tailored, but also the ferromagnetic state itself can be created [2] or destroyed depending on the material system under investigation. In particular the latter modifications open a route to the creation of nanomagnets [3] and magnonic crystals [4] by local ion irradiation. A current review will be given.

[1] M. Körner et al., Phys. Rev. B 88, 054405 (2013).
[2] R. Bali et al., Nano Lett. 14, 435 (2014).
[3] F. Röder et al., Sci. Rep. 5, 16786 (2015).
[4] B. Obry et al., Appl. Phys. Lett. 102, 202403 (2013).

Special Talk DS 21.4 Tue 15:00 H11

Large-scale reconstruction of metal-organic interfaces induced by chemisorption and surface stress change — •Eberhard Umbach[1,2], Florian Pollinger[1,3], Stefan Schmitt[1,4], Thomas Schmidt[2], Helder Marchetto[2], and Achim Schöll[1] — [1]Exp. Physik VII, Universität Würzburg, Am Hubland, 97074 Würzburg — [2]Fritz-Haber-Institut der MPG, Abt. CP, 14195 Berlin — [3]Physikalisch-Technische Bundesanstalt, D-38116 Braunschweig — [4]SPECS GmbH, D-13355 Berlin

The adsorption of large organic molecules on metal substrates can have enormous influence on the topography, geometric structure, and electronic properties of this interface provided that the interaction is chemisorptive. Thus, under certain preparation conditions large scale reconstructions may occur which originate from a significant change of surface stress and may involve large mass transport. These reconstructions can lead to regular nano-patterns which are useable as templates in a bottom-up approach in nanotechnology. More important could be that such reconstructions may have considerable influence on the electric and optical properties of metal-organic devices, and can even lead to failure, if, e.g., the interface between metallic electrode and adjacent organic layer changes under operating conditions.

The talk will address this topic using the archetype system PTCDA on various Ag surfaces some of which are highly-indexed (vicinal). Results from various surface methods including STM, spectro-microscopy and a cantilever bending method will be presented to analyze and interpret the results.